

REMARKS

Claims 1-29 are pending in the application and are at issue.

The courteous interview granted by Examiner Sastri's supervisor, David Wu, to applicants undersigned attorney and Jürgen Schroeder of BASF on June 12, 2007 is hereby acknowledged with appreciation. During the interview, the claims, cited references, and unexpected results demonstrated by the present invention were discussed in detail.

The present claims are directed to superabsorbent particles containing a superabsorbent polymer (SAP) and about 5% to about 50%, by weight, of a clay. The particles are prepared by a specifically claimed process including the steps of (a) polymerizing an *unneutralized* monomer to form a hydrogel (which contains a substantial amount of water), (b) comminuting the hydrogel to form hydrogel particles; (c) admixing the clay with the hydrogel particles (which are still unneutralized and contain substantial amounts of water), (d) *then* neutralizing the polymer-clay hydrogel particles 50% to 100%, and (e) finally drying the neutralized polymer-clay hydrogel particles. The resulting particles are optionally surface crosslinked (claim 2).

Important features of the recited method steps are polymerizing *unneutralized* monomers, admixing a clay with the resulting unneutralized SAP hydrogel particles, neutralizing the unneutralized SAP-clay hydrogel mixture *after* addition of the clay, and finally drying the SAP-clay hydrogel particles. This is the sequence of steps utilized to provide the claimed superabsorbent particles, and this sequence of method steps provides SAP-clay particles that demonstrate unexpected results over the superabsorbent particles of the cited art, as discussed in detail below. More particularly, particles of the present invention have a clay distributed homogenously on and into the hydrogel particles (see specification page 20, lines 24-26).

Surprisingly, it has been found that the absorption and retention properties of SAP-clay particles are improved by providing discrete particles containing *both* an SAP and a clay, wherein the clay is added to an SAP hydrogel prior to SAP neutralization. In addition, the presence of a clay on the surface of the SAP-clay particles facilitates drying of the SAP-clay hydrogel particles, and provides SAP particles that are easier to handle during

production of absorbent articles. These features allow a reduction in the amount of internal crosslinking monomer in the SAP, with a corresponding improvement in absorption properties. A reduction in the amount of internal crosslinker in the SAP component is possible because of an ability to readily handle and manipulate, and easily dry, the SAP-clay hydrogel particles.

Claim 2 stands rejected under the judicially-created doctrine of obviousness type double patenting over claim 1 of copending application 10/523,086. Applicants disagree with this contention of obviousness type double patenting because the present claims recite a particle having clay distributed *on and in* the particles, i.e., the clay is added to the hydrogel and admixed with the hydrogel to distribute the clay throughout the particle, *prior* to drying. In copending application 10/523,086, the clay is added to the SAP particle *after* drying, and during a surface crosslinking step to position the clay only in the vicinity of surfaces of the particle.

It is applicants' position therefore that claim 2 of the present application is not an obvious variant of claim 1 of copending application number 10/532,086 because of the substantial differences in structure between the SAP-clay particles of the two applications. However, to facilitate prosecution, applicants submit a timely filed terminal disclaimer concurrently with this response. Accordingly, it is submitted that the obviousness type double patenting rejection has been overcome and should be withdrawn.

Claim 7 stands rejected under 35 U.S.C. §112, first paragraph, for failing to provide enablement for cationic SAPs. The examiner contends that no neutralizing agents for the cationic SAPs of claim 7 are disclosed in the specification. Applicants traverse this rejection.

Claim 7 recites various cationic polymers each of which contains a nitrogen atom. Some of the cationic polymers are quaternized, and therefore already are in ionic form. The specification, at page 12, lines 13-16, also teaches that the cationic polymers recited in claim 7 are in the hydroxide (OH) or bicarbonate (HCO₃) form. Also, the specification incorporates U.S. Patent No. 6,235,965 by reference, which, at column 14, lines 19-21, also teaches the hydroxide and bicarbonate ion forms of cationic polymers.

In view of the disclosure in the specification, and that neutralization of nitrogen containing polymers is well known in the art, it is submitted that claim 7 fully complies with 35 U.S.C. §112, first paragraph, and that this rejection should be withdrawn.

Claims 1, 3-6, 8-11, and 17-21 stand rejected under 35 U.S.C. §102(b) as anticipated by, or under 35 U.S.C. §103 as being obvious over, McKinley et al. U.S. Patent No. 4,500,670 ('670). Applicants traverse this rejection.

As stated by the examiner, the '670 patent discloses a *blended* composition prepared by physically blending a water-swellaable hydrophilic polymer and an inorganic powder ('670 patent, abstract and column 2, line 67 through column 3, line 9). The physical blend of the '670 patent contains two types of discrete particles, i.e., the polymer and the powder. In contrast, the present claims recite a *single* discrete particle, wherein the SAP and clay are *both* present in the single particle, and the clay is distributed on and in the claimed particle. See present claim 1, steps 1(b)-1(c).

The '670 patent teaches (a) that the SAP is neutralized *prior* to the addition of the powder and (b) that the SAP and powder are dry blended. See '670 patent, column 2, lines 9-54, for the neutralized polymers that are dry blended with the powder. In accordance with the present invention, the clay is admixed with an *unneutralized* SAP hydrogel, which *then* is neutralized, *followed* by drying.

As stated in the specification, an important feature of the present invention is that the clay is added to the hydrogel *prior* to neutralization. See specification, page 15, lines 19-20. The unexpected results achieving by neutralizing after polymerization and clay addition is illustrated in Example 5 and Comparative Example 1 of the specification (specification, pages 22-24). Example 5 is directed to SAP-clay particles prepared in accordance with the present invention. Comparative Example 1 is similar to the method disclosed in the '670 patent, i.e., the hydrogel *first* is neutralized, *then* the clay is added to the hydrogel. Comparing the gel consistency data between Example 5 and Comparative Example 1 shows that adding a clay to an SAP hydrogel after neutralization adversely affects gel consistency, which in turn adversely affects handling of the SAP-clay hydrogel (specification, page 24, lines 3-6).

Also see Example 6 and Comparative Example 3 at pages 25 and 26 of the specification wherein the drying rate of the inventive SAP-clay particles (Example 6) is substantially faster than Comparative Example 3. Example 7 and Comparative Example 4 show further advantages of neutralizing the polymer after clay addition with respect to improved fluid absorbent properties, as do Example 8 and Comparative Example 5.

Overall, the presently claimed invention is directed to improving the permeability and absorption rates of SAP particles by introducing a clay into the SAP hydrogel prior to neutralizing the hydrogel. Addition of a clay to a hydrogel *prior to* neutralization facilitates drying of the hydrogel, and improves SAP performance with respect to rate of fluid absorption by a diaper core containing the SAP-clay particles, and fluid permeability through swollen SAP-clay particles. In particular, incorporating the resulting SAP-clay particles into a diaper core provides cores having improved fluid acquisition rates.

Accordingly, it is submitted that differences exist between claims 1, 3-6, 8-11, and 17-21 and the cited '670 patent. In particular, the physical blend of the '670 patent is substantially different from the discrete SAP-clay particles of the present invention. The anticipation rejection under 35 U.S.C. §102(b) of these claims therefore cannot be maintained. In addition, the differences between the present claims and the '670 patent are nonobvious differences.

Persons skilled in the art would have had no apparent reason from the '670 patent to prepare the SAP-clay particles as claimed. The '670 patent is directed solely to a physical blend of *dry* ingredients, with no teaching or suggestion to add a clay to an SAP hydrogel (that is not dry) or to provide a *single* particle containing an SAP and a clay. Furthermore, the '670 patent provides no incentive or apparent reason for a person skilled in the art to add a clay to an *unneutralized* SAP hydrogel, especially with any reasonable expectation of improving gel consistency by neutralizing after clay addition, as opposed to before clay addition.

In summary, for all the reasons set forth above, it is submitted that claims 1, 3, 6, 8-11, and 17-21 are neither anticipated under 35 U.S.C. §102(b) nor obvious under 35 U.S.C. §103 over the '670 patent and that the rejection should be withdrawn.

Claims 1, 3-6, 8, 9, 12-21, and 26-29 stand rejected under 35 U.S.C. §103 as being obvious over Schulz U.S. Patent No. 5,869,033 ('033) in view of Carrico et al. U.S. Patent No. 5,856,410 ('410). For the reasons set forth below, it is submitted that this rejection is in error and should be withdrawn.

The '033 patent is directed to a superabsorbent polymer containing an organophilic clay. The '033 patent teaches that an organophilic clay may be incorporated into an SAP, and the resulting composition can be incorporated into a fabric ('033, column 4, lines 35-40). The reference goes on to disclose that the preparation of the superabsorbent polymer is conventional, i.e., by polymerizing the monomers in aqueous solution. To persons skilled in the art this clearly means that the SAP is neutralized prior to adding the organophilic clay because an unneutralized polymer is not capable of absorbing water and is not an SAP ('033 patent, column 4, line 54 through column 5, line 19).

This entire disclosure in the '033 patent fails to teach or suggest incorporating a clay into an *unneutralized* SAP hydrogel, *then* neutralizing the SAP-clay hydrogel, and *then* drying the SAP-clay hydrogel.

The '033 patent contains no example teaching how an organophilic clay-treated SAP of the '033 patent is made. The only examples in the reference are directed to showing the effectiveness of an organophilic clay as an adsorbent and deactivator of fecal proteolytic enzymes. Because the general disclosure of the '033 patent states that the preparation of SAPs is conventional, and because the '033 patent teaches the addition of a clay to a superabsorbent powder (e.g., '033 patent, column 4, line 35 through column 5, line 19), the polymer *must* be a partially neutralized in order to act as an SAP. The '033 patent therefore provides no direction or any apparent reason to polymerize unneutralized monomers, add a clay, *then* neutralize the resulting mixture.

In summary, the '033 patent teaches a method substantially different from the method of preparing a presently claimed superabsorbent particle. The method of the '033 patent is like that of Comparative Example 1, discussed above, wherein the polymer is neutralized *before* clay addition. As discussed above, adverse effects are shown compared to neutralization *after* clay addition (see Example 5). Therefore, for the reasons set forth above

and with respect to the '670 patent, it is submitted that claims 1, 3-6, 8, 9, 12-22, and 26-29 would not have been obvious over the '033 patent alone.

The '410 patent does not overcome the deficiencies of the '033 patent. The '410 patent is directed to preparing an unneutralized polymer, then neutralizing the SAP ('410 patent, column 2, lines 42-50) to provide an SAP. The '410 patent is absolutely silent with respect to adding a clay to an SAP.

If the teachings of the '033 patent and the '410 patent are combined, the most that can be gleaned from the combined teachings is the preparation of a neutralized SAP according to the '410 patent, then use of that neutralized SAP in accordance with the '033 patent. This combination *still does not* provide any teaching, suggestion, or motivation to add a clay to an unneutralized polymer. In essence, the combined teachings lead back to the '033 patent, i.e., adding a clay to an already neutralized SAP. The references, alone or in combination, fail to provide any apparent reason to add a clay to an unneutralized polymer, followed by neutralization.

In summary, it is submitted that claims 1, 3-6, 8, 9, 12-21, and 26-29 would not have been obvious over a combination of the '033 and '410 patents, and that this rejection should be withdrawn.

Claims 1, 3-6, 8-11, and 17-21 stand rejected under 35 U.S.C. §102(b) as anticipated by, or under 35 U.S.C. §103 as obvious over, WO 00/72958 ('958). For the reasons set forth below, it is submitted that this rejection is in error.

WO '958 discloses a polymer/clay alloy *produced* from a monomer/clay mixture comprising monomer, crosslinking agent, and clay particles. Accordingly, the clay is added *before* polymerization of the monomers. This monomer/clay mixture *then* is polymerized. (WO '958, abstract and page 3, lines 17-21). This method is like Comparative Example 2 of the present application. Comparative Example 2, at page 24 of the present specification, shows that adding a clay to the monomer prior to polymerization adversely affects the polymerization process, even at low amounts of clay. Accordingly, the

superabsorbent particles of the present claims, made according to the claimed process steps, are different from the alloy of WO '958.

WO '958 also discloses Comparative Examples E and F (at page 20) in which a preformed polyacrylic acid is neutralized simultaneously with the addition of a clay. Table 7 of WO '958 clearly shows the disadvantages of this method.

In summary, the alloy of WO '958 is substantially different from the superabsorbent particles of the present invention such that an anticipation and an obviousness rejection cannot be maintained. WO '958 explicitly teaches neutralizing acrylic acid, then adding clay, then polymerizing the resulting solution. The present claims recite adding the clay to an unneutralized hydrogel, then neutralizing. The resulting products are different, as shown in Comparative Example 2 of the present specification, and the rejection under 35 U.S.C. §102(b) therefore cannot be sustained.

The present claims also would not have been obvious over WO '958. WO '958 actually leads persons skilled in the art away from the present claims, particularly in Comparative Examples E and F, which neutralizes simultaneously with clay addition. The present specification also shows the disadvantages of polymerizing the monomers in the presence of a clay.

Overall, WO '958 teaches a substantially different alloy prepared by a substantially different method than the particles of present claims. WO '958 also teaches away from clay addition after polymerization, and from neutralization after clay addition. Accordingly, it is submitted that the rejection of claims 1, 3-6, 8-11, and 17-21 under 35 U.S.C. §102(b) or under 35 U.S.C. §103 over WO '958 should be withdrawn.

Claim 2 stands rejected under 35 U.S.C. §103 as being obvious over WO '958 in view of Henderson et al. U.S. Patent No. 5,486,569 ('569). Claims 22-25 stand rejected under 35 U.S.C. §103 as being obvious over WO '958 in view of Beihoffer et al. U.S. Patent No. 6,596,921 ('921). For the reasons set forth above, with respect to WO '958, and for the reasons set forth below, it is submitted that these rejections are in error and should be withdrawn.

With respect to claim 2, WO '958 is discussed above. The '569 patent is relied upon for a teaching of surface crosslinking. Claim 2 recites a preferred embodiment of the present invention and it is submitted that claim 2 is patentable over WO '958 for the reasons set forth above. Applicants do not rely solely upon a feature of surface crosslinking for patentability of claim 2, but rely upon surface crosslinking *and all* of the features recited in independent claim 1. Claim 1 is patentable over WO '958, as discussed above, and dependent claim 2 also is patentable because the '569 patent fails to contain any teachings or suggestions that would lead a person skilled in the art to modify the teachings of WO '958 in a way that would lead to the presently claimed superabsorbent particles. The '569 patent is directed only to surface crosslinking, and is silent with respect to clay containing SAPs.

With respect to claims 22-25, directed to diapers, the '921 patent teaches basic diaper construction, but fails to teach or suggest the addition of a clay to an SAP, let alone by the method steps recited in the present claims. The patentability of the claimed superabsorbent particles over WO '958 has been discussed above. Because the particles are novel and nonobvious, a diaper containing the claimed particles also is novel and nonobvious.

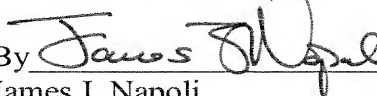
In summary, it is submitted that the rejections of claims 2 and 22-25 over WO '958 in view of the '569 and '921 patents, respectively should be withdrawn.

All pending claims are in a form for allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

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